

## The Effect of Fiscal Decentralization on Economic Convergence amongst Regions in Java Island (Spatial Econometric Approach)

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### Abstrak

*Dalam rangka menurunkan tingkat ketimpangan regional, diperlukan suatu mekanisme yang disebut konvergensi. Penelitian ini bertujuan untuk menguji eksistensi konvergensi ekonomi dan menganalisis pengaruh desentralisasi fiskal terhadap konvergensi ekonomi dengan pendekatan ekonometrika spasial. Pendapatan asli daerah, dana perimbangan, belanja pegawai dan belanja modal digunakan sebagai indikator desentralisasi fiskal. Dengan menggunakan analisis konvergensi dinamis, hasil penelitian menunjukkan bahwa terjadi konvergensi beta absolut dan kondisional pada kabupaten/kota di Pulau Jawa periode 2015-2019. Berdasarkan hasil estimasi, pendapatan asli daerah (PAD), dana perimbangan, dan belanja pegawai memiliki pengaruh yang signifikan terhadap pertumbuhan pendapatan per kapita, sedangkan belanja modal belum efektif dalam mendukung pertumbuhan. Apabila indikator desentralisasi fiskal ditambahkan dan aspek spasial dipertimbangkan dalam model, maka akan menyebabkan peningkatan tingkat konvergensi. Peningkatan kualitas belanja menjadi kunci utama percepatan konvergensi.*

**Kata Kunci:** desentralisasi fiskal, konvergensi ekonomi, ketimpangan regional, ekonometrika spasial.

### Abstract

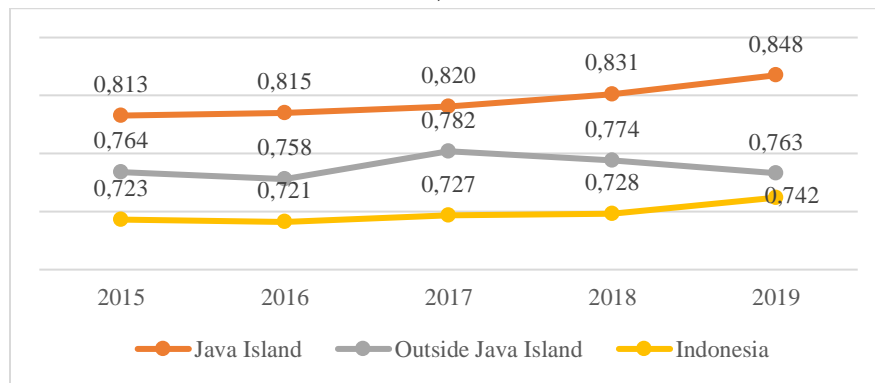
*Convergence mechanism is needed in order to reduce regional inequality. This study aimed to examine the existence of economic convergence and analyze the effect of fiscal decentralization on economic convergence with spatial econometric approach. Local own-source revenue, balance funds, personnel expenditure and capital expenditure as proxies for fiscal decentralization indicator. Using dynamic convergence analysis, the existence of beta absolute and conditional convergence are confirmed in this study. From the estimation result, local own-source revenue, balance funds, personnel expenditure have significant role on per capita income growth, while capital expenditure has not been effective in supporting growth. If fiscal decentralization indicators are added and spatial aspects are considered in the model, it will cause an increase in the convergence rate. Improving the quality of spending is the main key to accelerating convergence.*

**Keywords:** fiscal decentralization, economic convergence, regional inequality, spatial econometric.

## INTRODUCTION

Regional inequality is a fundamental problem that is often faced by developing countries, including Indonesia. Based on Williamson Index, Indonesia experienced a consistent increase in regional inequality in the 2015-2019 period. This is caused by the Indonesian economy which is still Java-centric. Java Island dominates the Indonesian economy by contributing more than 50% of Indonesia's GDP. Uniquely, with such a strong economy, Java Island still faces the problem of regional inequality, even with a more severe level of regional inequality compared to inequality outside Java and on a national scale, as presented at Figure 1.

Figure 1. Williamson Index between Regencies/Municipalities in Java Island, Outside Java Island and Indonesia, 2015-2019



Source: Author's calculation, 2022

The problem of regional inequality was increasingly highlighted when fiscal decentralization began to be implemented in Indonesia. Fiscal decentralization is considered as a strategy to increase equity and reduce regional inequality. With the advantage of information, the Government is expected to be able to implement public services in accordance with the preferences and needs of the community at a more efficient cost. However, despite this advantage, there are concerns that the implementation of fiscal decentralization policies will actually increase regional inequality (Mahi, 2016). This is due to the lack of preparation for the implementation of fiscal decentralization in Indonesia, in the sense that the ability of regions to perform better under a decentralized system is determined by many factors, including differences in the institutional capacity of local governments and the skills of local officials (Aginta et al., 2020).

Figure 2. Average Development of the LGR Ratio to Total Regional Income in Regencies/Municipalities on Java Island, Outside Java Island and Indonesia, 2015-2019



2006; Vidyattama, 2014). If there are variables that are spatially correlated, but spatial dependency factor is not considered, it will cause bias on estimation (Anselin, 1988; Aspriansyah & Damayanti, 2019). Therefore, spatial and neighborhood aspects are factors that must be considered in determining the economic conditions of a region. In addition, in several previous studies, most of the research used provincial-level units of analysis, while the basis for decentralization implemented in Indonesia is at the district/city level (Negara & Khoirunurrofik, 2021). According to this phenomenon, this study will focus on analyzing the influence of fiscal decentralization towards the convergence of per capita income in Java Island using a spatial econometric approach.

Given this research landscape, we draw some research questions as the extension of the previous studies and another contributions to address: (i) Does convergence occur in term of per capita income across regions in Java island ?, (ii) How does the influence of decentralization indicators affect per capita income growth and the acceleration of convergence?, (iii) Is there any spatial dependence in the income per capita growth process of districts in Java Island?

## METHODS

This research uses a quantitative method and involves 113 regencies/cities in Java Island in 2015 – 2019. DKI Jakarta is excluded as the research sample because DKI Jakarta is not an autonomous region, but a province. This research includes regencies which located on Madura Island, with the consideration that some of these regencies are administratively located in East Java Province. The data used in this study is obtained from Statistics Indonesia, Directorate General of Fiscal Balance in Ministry of Finance, Geospatial Information Agency. To find indications of convergence in the regional economy in Java Island, this research used two kinds of convergence analysis, namely absolute beta convergence and conditional beta convergence. This research uses classic panel regression for examine beta convergence and conditional beta convergence and spatial panel regression for conditional beta convergence analysis. Local generated revenue (LGR), balance funds, personnel expenditure, and capital expenditure are used as fiscal decentralization indicators.

The equation used for absolute convergence using the model from Barro & Sala-i-martin (1992) with the equation that relates to the growth rate of income per capita to level initial per capita income:

$$\ln \frac{y_{i,t}}{y_{i,t-1}} = Y_{i,t} = \alpha + \beta_0 \ln y_{i,t-1} + \varepsilon_{i,t}$$

While the equation used for conditional convergence as follows:

$$Y_{i,t} = \alpha + \beta_0 \ln y_{i,t-1} + \beta_1 LGR_{i,t} + \beta_2 BF_{i,t} + \beta_3 PE_{i,t} + \beta_4 CE_{i,t} + \varepsilon_{i,t}$$

Moran's I test is performed to detect spatial autocorrelation, and LISA analysis is added to explain spatial autocorrelation locally. There are two spatial model to analyze the existence of beta conditional convergence and the effect of fiscal decentralization on per capita income convergence, namely spatial autoregressive model (SAR) and spatial error model (SEM).

### Spatial autoregressive model (SAR)

$$Y_{i,t} = \alpha + \rho \sum_{j=1}^N W_{ij} Y_{j,t} + \beta_0 \ln y_{i,t-1} + \beta_1 LGR_{i,t} + \beta_2 BF_{i,t} + \beta_3 PE_{i,t} + \beta_4 GE_{i,t} + \beta_5 CE_{i,t} + \beta_6 HDI_{i,t} + \beta_7 ROAD_{i,t} + \beta_8 MANPOWER_{i,t} + \varepsilon_{i,t}$$



have high growth while regions with low per capita income tend to have slower per capita growth and thus convergence will be achieved.

**Table 1. Absolute beta convergence regression results between districts/cities in Java Island, 2015-2019**

Independent Variable	Dependent Variable = $\ln \frac{y_{it}}{y_{i,t-1}}$
Initial per capita income ( $\ln y_{i,t-1}$ )	-0.560198*** (0.0724217)
Intercept	5.734534*** (0.7341888)
Observations	565
Number of groups	113
R-squared	0.6324
v	8.21%
$\tau_{\text{half-life}}$	8.4 years
Time	16.8 years

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Stata 17

### Conditional Beta Convergence Analysis

Conditional beta convergence is a hypothesis that states the per capita growth of a region not only influenced only by income level but also need to consider other growth factors. The conditional beta convergence model that use classical panel regression (non-spatial) treats a region as closed and isolated economic units, ignoring the influence of spatial dependency. In fact, there is economic and social interaction between regions so that economic activity is not only influenced by factors within the region itself, but also by growth factors from neighboring regions. Based on Chow Test and Hausman Test result, the most appropriate method for conditional beta convergence analysis is fixed effect.

The estimation results for non-spatial panel regression models and spatial panel regression are presented in Table 2. With fixed effect regression, the convergence coefficient is -0.7148778 ( $\beta_0 < 0$ ), which means that conditional beta convergence occurred amongst regencies/municipalities in Java Island with convergence rate equal to 12,54%. It can be seen that there is a significant difference in the convergence coefficient between model that do not involve spatial effects and model that consider spatial effects. When spatial influences are included in the model, the convergence coefficient becomes -0.7983241 with convergence rate equal to 16.1% in SAR fixed effect and -0.7264789 with convergence rate approximately 12,94% in SEM fixed effect. It means that convergence analysis that consider several growth factors such as fiscal decentralization, human development index, infrastructure and manpower and include spatial effect can accelerate convergence rate and reduce the time needed to eliminate the gap between poor regions and rich regions.

**Table 2. Conditional beta convergence regression results between districts/cities in Java Island, 2015-2019**

Variables	Without spatial effect	With spatial effect	
	Fixed effect regression	SAR fixed effect	SEM fixed effect
<b>Intial per capita income (<math>\ln y_{i,t-1}</math>)</b>	-0.7148778*** (0.0276874)	-0.7983241*** (0.0476231)	-0.7264789*** (0.0366618)
<b>Local Generated Revenue</b>	0.1712574** (0.0749225)	0.1932582*** (0.0683782)	0.0347441 (0.0623659)
<b>Balance Funds</b>	0.0555098** (0.0225608)	0.0933464** (0.0224346)	0.0493406 (0.0439967)
<b>Personnel Expenditure</b>	-0.2549104*** (0.673264)	-0.203046*** (0.0596495)	-0.0069685 (0.0470482)
<b>Goods and Services Expenditure</b>	0.002950 (0.958563)	0.0327013 (0.0805247)	0.0165553 (0.0823299)
<b>Capital Expenditure</b>	-0.0737944 (0.0635971)	-0.0018931 (0.0591394)	-0.085819 (0.0527801)
<b>Human Development Index</b>	0.0504819*** (0.0040277)	0.0349297** (0.0040928)	0.0245734 (0.0042586)
<b>Road Infrastructure</b>	-0.0139482 (0.0106302)	-0.0060703 (0.0080506)	-0.0054799 (0.0083843)
<b>Manpower</b>	0.5876963*** (0.1647252)	0.5123667*** (0.1336616)	0.2258427* (0.1368005)
<b>Intercept</b>	5.262207*** (0.3086665)	3.4351272*** (0.0256125)	5.1894305*** (0.01618396)
<b>Observations</b>	565	565	565
<b>Number of groups</b>	113	113	113
<b>R-squared</b>	0.9272	0.9325	0.6321
<b>v</b>	12.54%	16.1%	12.94%
<b>T<sub>half-life</sub></b>	5.5 years	4.3 years	5.3 years
<b>Time</b>	11 years	8.6 years	10.6 years

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Stata 17

The estimation results of the SAR fixed effect model show the same direction and significance as the parameter estimation results of the non-spatial panel regression model, but there is a difference in significance in the SEM fixed effect model. To select the best spatial model, the LM test was carried out. Based on the results of the LM test, both SAR and SEM have significant *p-values* ( $0.000 < 0.005$ ), so that R squared is used to determine which model is best for this study. Based on the results of the analysis, the

R square in the SAR (0.9325) is larger than R-squared in the SEM (0.6321), so the model chosen is Spatial Autoregressive Model (SAR).

When the spatial aspect is ignored, several independent variables in the non-spatial panel regression model have larger coefficients. This is due to the influence of other variables that are not considered (in this case spatial linkages) in the non-spatial panel regression model. However, when the spatial linkage aspect has been controlled for in the SAR and SEM models, the independent variables are free from spatial effect.

Based on the results of the SAR fixed effect estimation, local generated revenue, balance funds, personnel expenditure, human development index, and manpower have a significant effect on per capita growth while capital expenditures, goods and services expenditures, and road infrastructure have no significant effect on per capita income growth. Local generated revenue and balance funds are able to contribute positively to growth in per capita income and accelerate convergence through their role as a source of government funds to carry out work programs to create people's welfare. Personnel expenditure has negative significant effect on per capita income growth because it is included in the category of consumptive expenditure, where if the portion is too large it will burden the local government budget (APBD) and erode the portion of productive expenditure. Capital expenditure has no significant effect on this study because the portion of capital expenditure is quite low and the research period is limited so that the impact has not been seen significantly. Human Development Index and manpower have the important role to per capita income growth. The higher the quality of human resources, the more qualified, competitive and innovative the goods and services produced so that this becomes one of the strategies in increasing per capita income. From manpower side, an increase in the labor force that is included in the working category will increase output and stimulate economic activity in the region so that it will have an impact on increasing per capita income growth, as presented in Table 3

### Spatial Autocorrelation Analysis on Per capita Income Growth

The results of Moran's I test show that there is a spatial autocorrelation in the growth of income per capita, as presented in Table 3. Therefore, based on the global spatial autocorrelation test, per capita income growth in a region will provide a positive spillover (spread effect greater than the backwash effect) on per capita income growth in surrounding areas. This finding is in line with Yudistira & Sohibien (2020), Vidyattama (2014) and Dekiawan (2014).

Table 3. Results of Moran's I Test on the growth of income per capita at the Regency/City level in Java Island for the 2015-2019 period

Moran's I	E(I)	Z-score	p-value
0,8428	-0,9915	8,749	0,000***

Note: \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Source: Stata 17

If global spatial autocorrelation can be explained by Moran's I, locally spatial autocorrelation is explained by Local Indicator Of Spatial Association (LISA) analysis. The following is the result of LISA analysis on income per capita growth amongst regencies/municipalities in Java Island for 2015-2019 period.





any distribution of Revenue Sharing Funds at all. This happened to oil exploration by Exxon Mobile Cepu, Ltd which controls the Cepu block in Bojonegoro. The working area of the Cepu Block consists of the Bojonegoro and Blora, small part Tuban, while the location point for the oil exploration is in the Banyu Urip Field, Bojonegoro Regency. With the allocation policy for the revenue sharing funds for the results of oil mining, Blora and Central Java Province did not receive any funds for the results of oil mining from Exxon Mobbille Cepu, Ltd. Eventhough the area is directly adjacent to Bojonegoro and get negative externalities from the oil exploration work area in the Cepu Block, such as road infrastructure in the area which is often badly damaged due to the frequent passage of vehicles carrying heavy equipment for drilling.

## CONCLUSIONS

Based on the results of the analysis, there are absolute beta and conditional beta convergence in per capita income amongst regencies/municipalities in Java Island for the 2015-2019 period. Fiscal decentralization plays an important role in growing per capita income and accelerating the convergence of per capita income. The indicators of fiscal decentralization that have a significant impact on the growth of per capita income are local generated revenue. balance funds and personnel expenditures. while capital expenditures has not been effective in increasing regional economic growth. With the existence of spatial autocorrelation on per capita income growth. the government needs to consider aspects of spatial dependency in formulating development policies. Considering the spatial effect. Several steps that can be taken by the Government in a fiscal decentralization policy to strengthen the spread effect and weaken the backwash effect are (1) encouraging economic cooperation between regional governments to increase regional revenues and increase the fiscal capacity of each region. (2) considering the role of regions with status as centers of growth into the transfer fund formula as regional incentives. (3) redesign the management of transfers to the regions by allocating natural resource revenue-sharing funds to producing. processing and nonproducing regions that are directly adjacent to the producing regions. (4) reallocating government spending by increasing productive capital expenditure and reducing the excessive portion of personnel expenditure and (5) provide adequate infrastructure for regencies/cities in Java and improve the quality of human resources through equitable education. Future research can include other control variables such as commuter work and investment. analyze the government spending by sector or function. and add other more relevant spatial weights such as transportation costs. migration volume and trade patterns to make more comprehensive analysis.

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